

## TWO NEW SPECIES OF ORSILLINE LYGAEIDAE (HETEROPTERA) FROM THE HAWAIIAN ISLANDS

DAN A. POLHEMUS

Department of Systematic Biology–Entomology, National Museum of Natural History, Smithsonian Institution, Washington, DC, 20560-0105, U.S.A. (e-mail: bugman@bishopmuseum.org)

---

*Abstract.*—Two new species of orsilline Lygaeidae are described from the Hawaiian Islands: *Oceanides gruneri*, taken in canopy fogging samples from ohia trees (*Metrosideros polymorpha*) on eastern Molokai; and *Nesius (Physonysius) poepoe*, collected from understory vegetation in the upper elevations of the West Maui Mountains. Shaded habitus drawings and distribution maps are provided for both new species, the male paramere of *N. (Physonysius) poepoe* is illustrated, and a revised key to the species in the subgenus *Physonysius* is included.

*Key Words:* Lygaeidae, Hawaii, *Oceanides*, *Nesius*, new species, illustrations, key

---

As interpreted by Ashlock (1967), the tribe Metrargini in the Lygaeidae contains 6 genera endemic to the Hawaiian Islands, which have produced a diverse insular radiation of 80 endemic species and subspecies (Usinger 1942; Usinger and Ashlock 1958; Ashlock 1966, 1983; Nishida 1997). Although most of the species occurring in obvious or easily accessible habitats have now been described, additional new species are discovered on a regular basis in remote localities or unusual microhabitats. The present paper describes two such taxa, taken from upland wet forest habitats on the islands of Maui and Molokai.

In the descriptions below, all measurements are given in millimeters, and represent the dimensions of the holotype specimen. CL numbers in the material examined sections refer to a coding system used to cross reference ecological data and habitat photographs. Collection depository codons are given in the acknowledgments section. English system equivalents of metric elevational data are given in brackets, to pro-

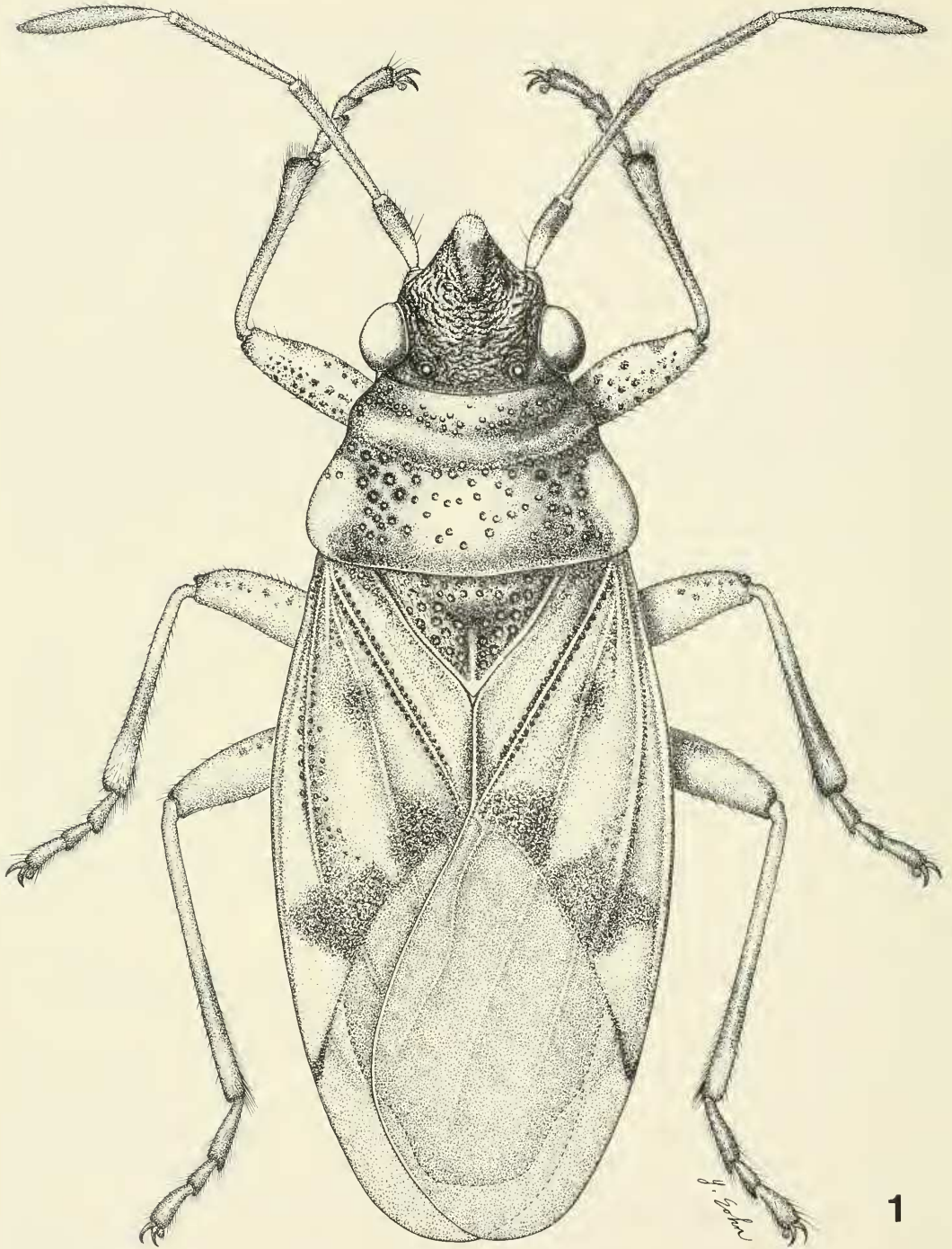
vide compatibility with USGS topographic maps.

Holotypes of both new species described herein are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Paratypes are also deposited in that collection, and in the Bernice P. Bishop Museum in Honolulu (BPBM).

### *Oceanides gruneri* Polhemus, new species (Figs. 1–2)

*Description.*—*Macropterous male:* Overall length 4.70; maximum width (across abdomen) 1.85. General coloration dark brown to black, with extensive pale coloration on pronotum and hemelytra.

*Head:* Length 0.85, width 1.10, general coloration black, tip of tylus dark yellow, eyes and ocelli pale reddish; dorsal surface slightly elevated between eyes, coarsely rugulose, sparingly clothed with recumbent pale pubescence, this pubescence denser in areas behind eyes and laterad to ocelli; an-



1

Fig. 1. *Oceanides gruneri*, male, dorsal habitus.

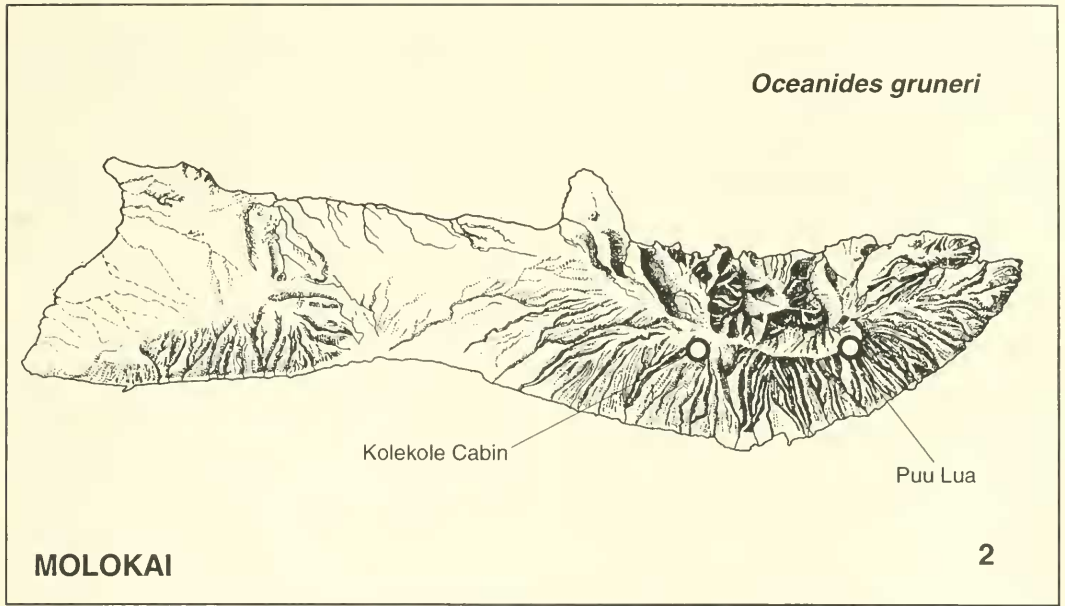


Fig. 2. Distribution of *Oceanides gruneri* on Molokai.

teocular length 0.42, equal to  $1.2 \times$  dorsal length of an eye; eye length 0.35, width 0.25; interocular space 1.12; ocelli small; buccula low, gradually tapering in height, without abrupt change in width to base of head; rostrum pale brown, apex dark, reaching beyond hind coxae, segment I nearly reaching base of head, segment lengths (from base) 0.75, 0.70, 0.75, 0.65; antennae long, slender, segments I and IV distinctly thicker than II and III, all segments dark brown, extreme base of segment I and extreme distal ends of segments I–III creamy white, all segments bearing short erect pale setae, these setae slightly shorter than the diameters of these segments, segment I with 3 longer setae near base, lengths of segments I–IV = 0.35, 0.65, 0.60, 0.60.

**Pronotum:** Length 0.55, maximum width 1.55, dark brown to blackish, with yellowish-white markings narrowly along extreme anterior margin, broadly on central portion of posterior lobe, and on posterolateral angles; calli black, shining, margins bearing pale recumbent pubescence, anterior collar and posterior lobe shining, without evident setae, surfaces sparsely set with

deep, dark brown punctations; lateral pronotal margins bulging outward at lateral margins of calli.

**Scutellum:** Length 0.52, maximum width 0.80, black, bearing a narrow, raised, longitudinal medial carina on posterior half, marked by a slender white longitudinal stripe; surface coarsely rugulose, thickly clothed with recumbent pale pubescence.

**Hemelytra:** Macropterous, extending well beyond end of abdomen, weakly rugose, bearing scattered pale recumbent setae; general coloration yellowish white with scattered dark markings, clavus entirely pale except for narrow dark patch along commissure, and lines of dark brown punctations on either side of claval suture; corium bearing a single roughly circular blackish spot in basal half traversing the cubitus, two additional larger and more irregular blackish patches on distal half adjacent to base of wing membrane, and a small dark mark at extreme posterior angle; membrane uniformly pale translucent brown; costal margins broadly and evenly arcuate.

**Legs:** Yellowish white, dorsal surfaces of femora spotted with dark brown, dorsal fac-

es of tibiae and tarsi narrowly medium brown; all segments clothed with fine, pale, semi-recumbent setae intermixed with scattered longer erect pale setae; tibiae slightly expanded near distal ends. Lengths of leg segments as follows: fore femur, tibia, tarsal I, tarsal II, tarsal III = 1.12, 1.00, 0.20, 0.10, 0.20; middle femur, tibia, tarsal I, tarsal II, tarsal III = 1.12, 1.00, 0.25, 0.10, 0.20; hind femur, tibia, tarsal I, tarsal II, tarsal III = 1.25, 1.40, 0.35, 0.10, 0.12.

*Ventral surface:* Black, acetabula and peritreme dark yellow, abdominal ventrites VI–VIII marked with medium brown; ventrolateral portions of head and thorax and all of abdomen bearing numerous pale recumbent setae.

*Macropterous female:* Length 5.15; maximum width 2.00. Similar to male in general structure and coloration with following exceptions: posteromedial portion of pronotum not so broadly marked with yellowish white; ventromedial portion of abdomen basal to ovipositor sheath broadly marked with dark yellow.

*Etymology.*—It is my pleasure to name this species in honor of Daniel S. Gruner, a friend and colleague whose canopy fogging study of *Metrosideros polymorpha*, undertaken during his tenure as a graduate student at the University of Hawaii, has greatly increased our understanding of speciation and diversification processes in the Hawaiian insect biota.

*Material examined.*—Holotype, macropterous ♂: HAWAIIAN ISLANDS, Molokai Is., rain forest at Kolekole Cabin, Kamakou TNCH Preserve, 1,220 m [4,000 ft], 21°06'15"N, 156°53'47"W, 23 October 1997, CL 8071, canopy fogging sample MO97-1+2-Sc, D. A. Polhemus and D. Gruner (USNM). PARATYPES (all macropterous): HAWAIIAN ISLANDS, Molokai Is.: 1 ♂, same data as holotype except canopy fogging sample MO9705-1-1 (USNM); 1 ♀, same data as holotype except canopy fogging sample MO9704-2-1 (USNM); 1 ♀, same data as holotype except taken from bundle of dead *Cibotium*

tree fern fronds, 21–25 October 1997, D. A. Polhemus (USNM); 2 ♂, Kamakou Preserve, road between cabin and Puu Kolekole, 1,170 m [3,840 ft], 22 October 1997, Coll. #85, C. P. Ewing, on *Cheirodendron trigynum* (BPBM); 1 ♀, lee side of Puu Lua, nr. rim of Wailau Valley, 2,750–3,000 ft., 15 June 1999, 21°06'28"N, 156°48'48"W, CL 8342, D. A. Polhemus, on *Cheirodendron* sp. (USNM).

*Discussion.*—*Oceanides gruneri* belongs to a distinctive set of *Oceanides* species with contrasting black and white dorsal markings. It is similar in general appearance to *O. humeralis* Ashlock from Kauai, *O. perkinsi* Usinger and *O. incognitus* Usinger from the Koolau Mountains of Oahu, and *O. oresitrophus* (Kirkaldy) from East Maui, and it seems likely that all of these species will eventually prove to be members of a monophyletic segregate within the *Oceanides* lineage. Both *O. gruneri* and *O. oresitrophus* may be separated from *O. humeralis*, *O. perkinsi*, and *O. incognitus* by the presence of a black spot transgressing the cubital vein in the basal half of the hemelytron. In turn, *O. gruneri* and *O. oresitrophus* may be separated from each other by the length of the anteocular portion of the head, which is 1.2× the dorsal length of an eye in *O. gruneri* but equal to the eye length in *O. oresitrophus*; by the length of antennal segment II, which is 1.8× the length of antennal segment I in *O. gruneri*, versus 2.0× the length of segment I in *O. oresitrophus*; and by the presence of an irregular patch of pale coloration centrally on the posterior pronotum in *O. gruneri*, which is lacking in *O. oresitrophus*. The pale markings on the corium of *O. gruneri* also have a more yellowish overall hue than those of *O. oresitrophus*, which are a clearer, brighter white.

Most captures of *O. gruneri* to date have come from canopy fogging samples taken from ohia trees (*Metrosideros polymorpha*). It is uncertain whether this species occurs in the canopy itself, or on the pads of moss that cover many of the branches; the col-

lection of several additional specimens on *Cheirodendron trigynum* trees suggests the latter. In any case, the lack of previous captures at the relatively well-collected Kolekole Cabin type locality on Molokai by entomologists operating near ground level strongly indicates an arboreal habit for this species.

*Nesius (Physonysius) poepoe* Polhemus,  
new species  
(Figs. 3–5)

**Description.**—*Submacropterous male*: Overall length 3.80; maximum width (across abdomen) 1.75. General coloration uniform shining reddish brown, with a few contrasting paler or darker markings on head and scutellum.

**Head**: Length 0.55, width 1.00, general coloration reddish brown, tylus, vertex adjoining inner margins of eyes, and postero-medial portion of vertex dark yellow, posterior margin of head dark brown, eyes silvery black, ocelli pale orange brown; dorsal surface slightly elevated between eyes, smooth; dorsal head sparingly clothed with recumbent pale pubescence, this pubescence slightly denser in areas behind eyes and laterad to ocelli, and flanking tylus; antecular length 0.30, equal to dorsal length of an eye; eye length 0.30, width 0.22; interocular space 0.60; ocelli small; buccula low, barely raised, gradually tapering in height without abrupt change in width to base of head; rostrum pale brown, apex dark, reaching to hind coxae, segment I nearly reaching base of head, segment lengths (from base) 0.50, 0.50, 0.50, 0.45; antennae long, slender, segments I and IV distinctly thicker than segments II and III, segment I pale brown, suffused with dark brown centrally, segment II dark brown, suffused with pale brown centrally, segment III dark brown, segment IV medium brown, extreme base of segment I and extreme distal ends of segments I–III creamy white, all segments bearing short erect pale setae, these setae slightly shorter than the diameters of these segments, segment I with 3

longer setae near base, lengths of segments I–IV = 0.27, 0.55, 0.52; 0.60.

**Pronotum**: Length 0.70, maximum width 1.37, uniform reddish brown, shining, lacking pubescence; calli weakly raised, margins lacking setae; anterior collar and posterior lobe sparsely set with deep, dark brown punctures; lateral pronotal margins weakly sinuate, not bulging strongly outward at lateral margins of calli.

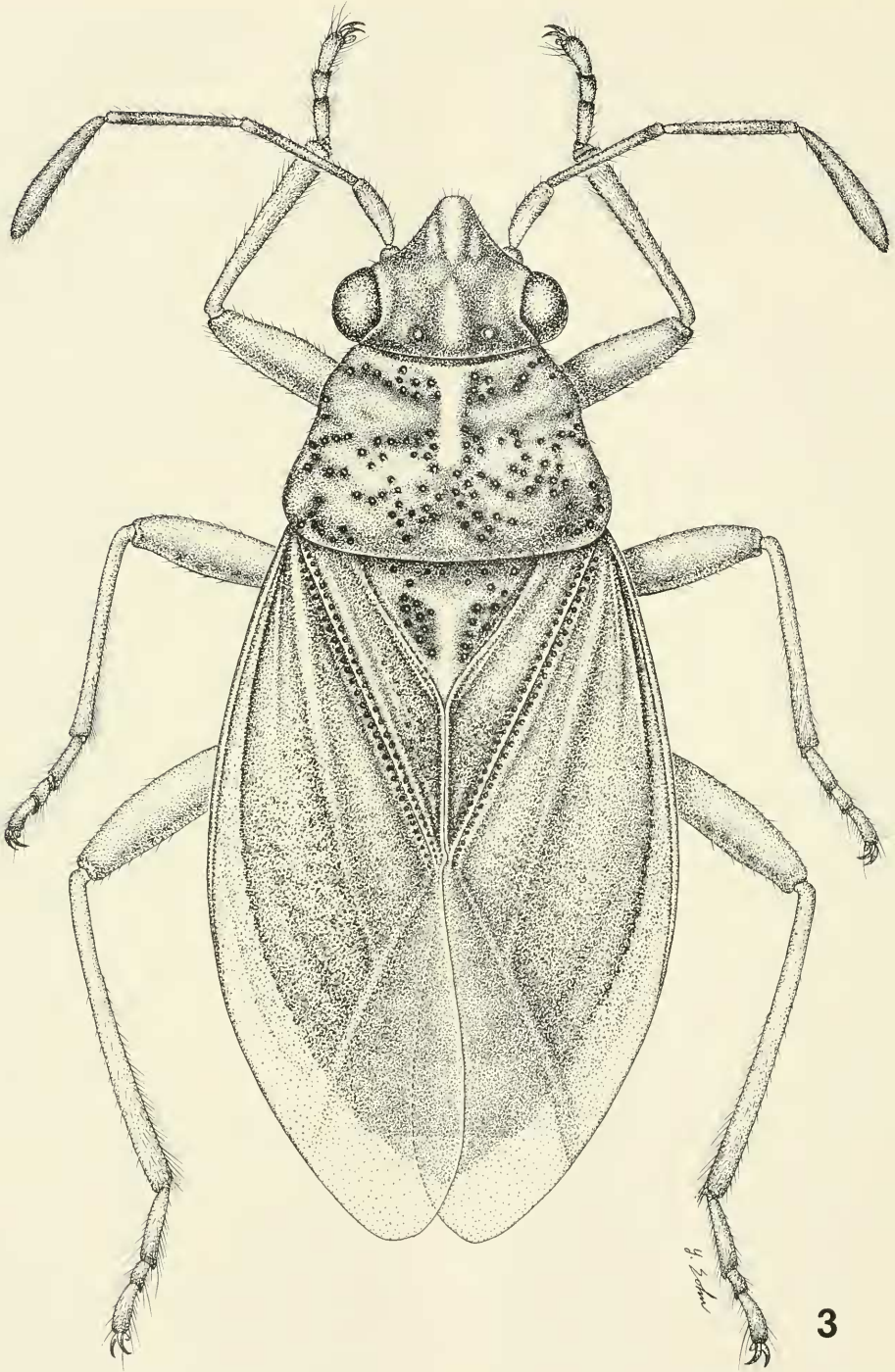
**Scutellum**: Length 0.55, maximum width 0.70, shining, lacking pubescence; overall coloration reddish brown, posterior half with a pale posteromedial stripe running along a narrow, raised, longitudinal medial carina; basal section smooth, lateral sections deeply and coarsely punctate.

**Hemelytra**: Convex and submacropterous, nearly coleopteriform, venation of corium obscure, membrane highly reduced; dorsal surface weakly rugose, shining, bearing scattered short, pale, semi-erect setae; coloration uniformly translucent reddish brown to orange brown, without contrasting markings; membrane of each hemelytron not completely overlapping with that of other when wings are at rest.

**Legs**: Uniformly orange brown, except for a few small dark brown spots or mottled areas on posterior faces of middle and hind tibiae; all segments clothed with fine, pale, semi-recumbent setae. Lengths of leg segments as follows: fore femur, tibia, tarsal I, tarsal II, tarsal III = 0.90, 0.87, 0.15, 0.07, 0.12; middle femur, tibia, tarsal I, tarsal II, tarsal III = 1.00, 0.90, 0.17, 0.07, 0.12; hind femur, tibia, tarsal I, tarsal II, tarsal III = 1.20, 1.30, 0.25, 0.12, 0.15.

**Ventral surface**: Dark brown to black, acetabula and peritreme yellowish white, evaporative area surrounding peritreme dull matte grey, abdominal ventrites VI–VIII marked with medium brown, genital segment orange brown; ventrolateral portions of head and thorax and all of abdomen bearing numerous pale recumbent setae.

**Male paramere**: Stout and set with spine-like setae basally, distal section form-



3

Fig. 3. *Nesius (Physonysius) poepoe*, female, dorsal habitus.

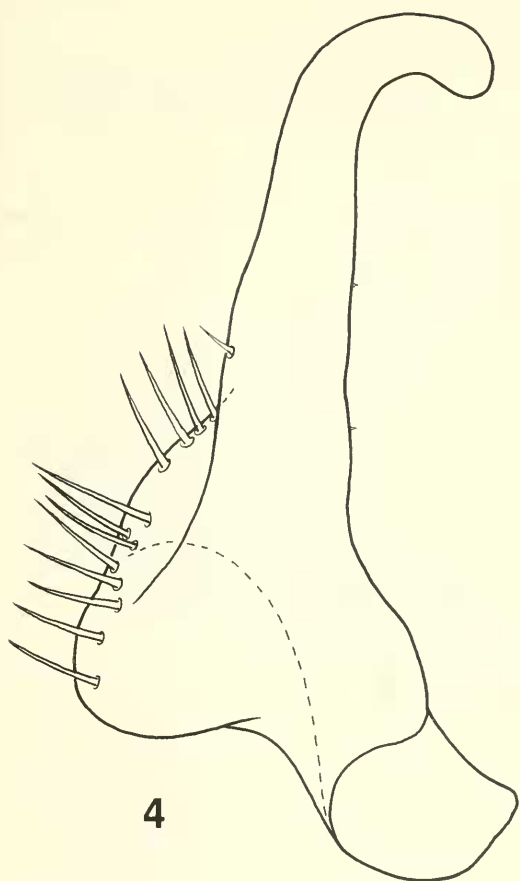


Fig. 4. *Nesius (Physonysius) poepoe*, male right paramere, dorsal view.

ing a slender, elongate shaft, tip hooked and rounded (Fig. 4).

*Brachypterous female*: Slightly larger than male, length 4.20; maximum width 2.00. Similar to male in general structure and coloration, but with end of terminal abdomen bright red.

*Etymology*.—The name “poepoe” comes from the Hawaiian word for “rounded,” and refers to the overall body shape of this species.

*Material examined*.—HOLOTYPE, submacropterous ♀: HAWAIIAN ISLANDS, Maui Is., West Maui Mountains, moss forest nr. Puu Kukui summit, 1,750 m [5,740 ft], 20°53'37"N, 156°35'22"W, 11 May 1992, CL 8109, D. A. Polhemus (USNM). PARATYPES (all submacropterous): HAWAIIAN

ISLANDS, Maui Is.: 1 ♂, 1 ♀, West Maui Mountains, valley and ridge S. of Mt. Eke, Eke Natural Area Reserve, 1,310 m [4,297 ft], 20°55'04"N, 156°34'22"W, 23–25 May 1997, CL 8291, D. A. Polhemus (USNM); 1 ♀, West Maui Mountains, Puu Kukui trail between Nakalalua and Violet Lake, 1,340–1,490 m [4,395–4,487 ft], 3 March 1998, R. Takumi (BPBM); 1 ♂, West Maui Mountains, Puu Kukui trail at Nakalalua, 1,350 m [4,430 ft], 20°54'55"N, 156°35'32"W, 22–23 May 1997, CL 8114, D. A. Polhemus (USNM).

*Discussion*.—Usinger (1942) proposed *Physonysius* as a subgenus of *Nesius* to hold two very distinctive species characterized by their rounded overall form, submacropterous hemelytra, and smooth, shining dorsal surfaces: *Nesius (Physonysius) molokaiensis* from eastern Molokai, and *Nesius (Physonysius) ampliatus* from Haleakala, eastern Maui. *Nesius (Physonysius) poepoe* may be easily separated from these two taxa by its smaller body size, longer rostrum, and shorter hemelytra, as given in the supplemental key provided below (revised from Usinger 1942).

REVISED KEY TO SPECIES OF SUBGENUS  
*PHYSONYSIUS*

Based on Holotypes

1. Rostrum long, extending to hind coxae; overall body length 4.6 mm or less; ground color distinctly reddish; West Maui .....  
..... *N. (P.) poepoe*, n. sp.
- Rostrum shorter, extending only to middle coxae; overall body length exceeding 5.0 mm; ground color dark brown or black; East Maui and Molokai ..... 2
2. General coloration uniform dark brown, without extensive pale markings; head uniformly dark brown dorsally, without a pale stripe along midline; embolium translucent reddish brown along entire length; scutellum with basal angles brown, not contrasting with central portion; East Maui (Haleakala) .....  
..... *N. (P.) ampliatus* Usinger
- General coloration dark brown to black with scattered paler markings; head dark brown dorsally but with a dark yellowish longitudinal midline stripe on vertex; embolium pale translucent yellowish on basal two thirds; scutellum

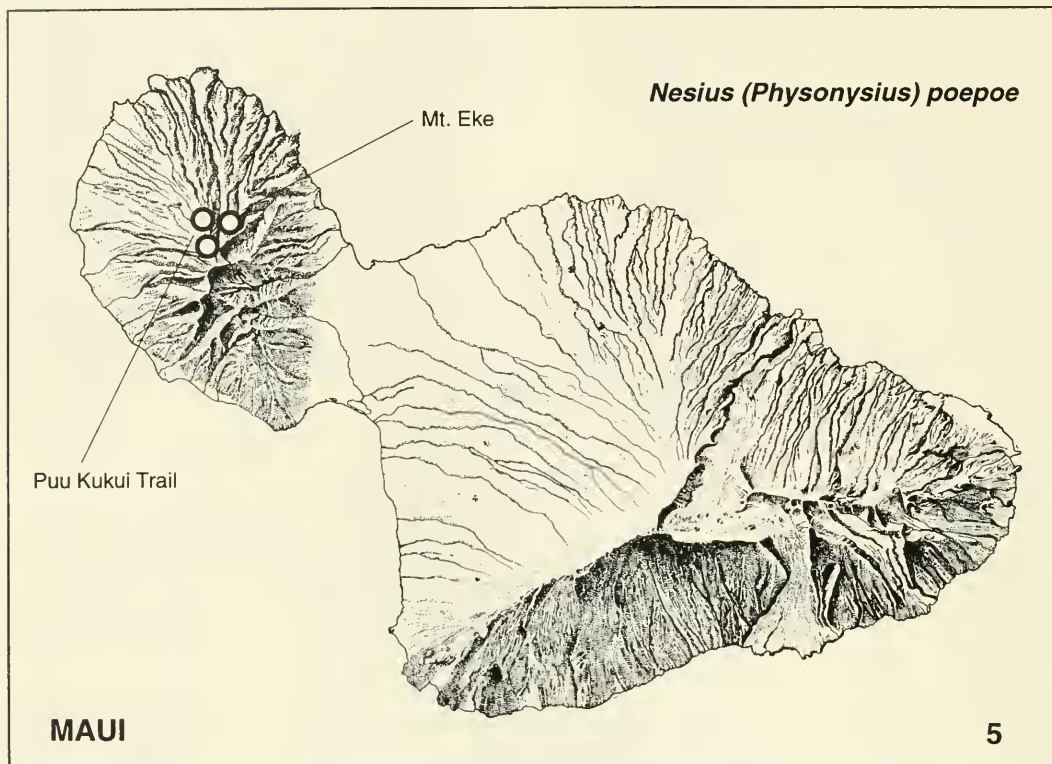


Fig. 5. Distribution of *Nesius (Physonysius) poepoe* on Maui.

with basal angles pale yellowish, contrasting with dark central portion; Molokai . . . . .  
 . . . . . *N. (P.) molokaiensis* Usinger

Certain strongly brachypterous individuals of *Nesius (Nesius) kirkaldyi* (Usinger), endemic to eastern Maui, can also approach *Nesius (Physonysius) poepoe* in size and shape, but are orange brown rather than reddish brown in overall coloration, have the embolar margin of the hemelytra less strongly expanded and arcuate, and have the overall hemelytral surface finely rugulose, rather than smooth and shining. These brachypterous forms of *N. (Nesius) kirkaldyi* also retain a more completely developed wing membrane, so that the membranes of both hemelytra completely overlap when the wings are closed, while in *N. (Physonysius) poepoe* the wing membrane is greatly reduced, creating only a narrow amount of overlap, if any, between the two wing membranes in the closed position (Fig. 3). To

date, no fully macropterous individuals of *N. (Physonysius) poepoe* have been collected, while many such individuals of *N. (Nesius) kirkaldyi* are present in the Bishop Museum collection.

*Physonysius* clearly forms a distinct clade within the Hawaiian *Nesius* radiation, and could potentially be raised to full generic status. This decision is complicated, however, by the fact that certain other Hawaiian *Nesius* species exhibit morphologies intermediate between *Physonysius* and other less highly modified *Nesius* species. In particular, the above-mentioned *N. (Nesius) kirkaldyi* (Usinger), endemic to Maui, and *Nesius (Trachynysius) whitei* (Blackburn), from Hawaii island, display a range of variation in their wing morphs which in the most extreme states of submacroptery approximate the arcuate-margined, nearly coleopteriform condition seen in *Physonysius*. As a result, Usinger's (1942) placement of



*Physonysius* as a subgenus of *Nesius* is retained for the present pending a phylogenetic analysis of the entire Hawaiian *Nesius* radiation.

As currently understood, the distribution of *Physonysius* is limited to islands on the Maui Nui platform near the southeastern end of the Hawaiian Archipelago. With the collection of *N. peopoe*, species are now known from three of the four high volcanoes in this island group: Molokai, West Maui and Haleakala. Given this distribution, it is probable that a member of the subgenus will also eventually be discovered on Lanai, the only other volcano on the Maui Nui platform that rises to an elevation sufficient to support wet upland forests favored by *Physonysius*.

#### ACKNOWLEDGMENTS

This revision is based primarily on material collected by the author during field surveys supported by the Smithsonian Institution's Drake Fund (USNM), or held in the collections of the Bernice P. Bishop Museum, Honolulu, Hawaii (BPBM). It could not have been completed without the generous cooperation of the staff in the Department of Natural Sciences at the latter institution, particularly Scott E. Miller (now with the Smithsonian Institution), David Preston, Francis G. Howarth, and Gordon Nishida. I also thank James K. Liebherr of Cornell University and Curtis Ewing, from

the University of Hawaii, for companionship and assistance in the field; the staff of Pacific Helicopter Tours, Inc., who provided access to remote field sites on Molokai and in the West Maui Mountains; Randy Bartlett and Hank Oppenheimer of the Maui Land and Pineapple Company, who kindly allowed access to Puu Kukui and surrounding ridge trails; and the Nature Conservancy of Hawaii (TNCH), who permitted collections in their Kamakou Preserve on eastern Molokai. This paper represents contribution 2002-002 to the Hawaii Biological Survey.

#### LITERATURE CITED

- Ashlock, P. D. 1966. New Hawaiian Orsillinae (Hemiptera-Heteroptera: Lygaeidae). *Pacific Insects* 8(4): 805-825.
- . 1967. A generic classification of the Orsillinae of the world (Hemiptera-Heteroptera: Lygaeidae). *University of California Publications in Entomology* 48: vi + 82 pp.
- . 1983. A new species, nomenclatural notes, and new records for Hawaiian Orsillinae (Hemiptera: Heteroptera: Lygaeidae). *International Journal of Entomology* 25(1): 42-46.
- Nishida, G. M. 1997. Hawaiian terrestrial arthropod checklist. Third edition. Bishop Museum Technical Report 12: iv + 263 pp.
- Usinger, R. L. 1942. The genus *Nysius* and its allies in the Hawaiian Islands (Hemiptera, Lygaeidae, Orsillini). *Bernice P. Bishop Museum Bulletin* 173: i + 167 pp., 12 pl.
- Usinger, R. L. and P. D. Ashlock. 1958. Revision of the Metargini (Hemiptera: Lygaeidae). *Proceedings of the Hawaiian Entomological Society* 17(1): 93-116.